

μ -LANNDD @ CERN
TEST BEAM AREA AND DETECTOR MAGNET

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1 – Test beam area

Meeting at MCR Conference Hall, Bdg. 354 1-002, 11/12/01, 11:00

Attending:

Jean-Pierre Riunaud (*PS/AE*), *Leader of the Accelerator and Experimental Areas Group (AE)*

Luc Durieu (*PS/AE*), *Leader of the Ring, Transfer Lines and Areas Section (RA)*

Michael Hauschild (*EP/OPE*), *SPS/PS Physics Coordinator*

Claudio Cerri (*INFN-Pisa*)

Franco Sergiampietri (*INFN-Pisa*)

The theme of the research has been described; the beam time is roughly estimated as 3-4 weeks effective data taking, 2-3 months area occupation; the beam intensity of about 1000-4000 electrons/s.

For a request of test beam area for a period longer than 2 weeks a proposal (**MoU**) is required. The proposal should be sent at least 2-3 weeks before an SPSC meeting to the SPSC secretary Monique Budel (DSU/DO). A referee will be appointed by the committee to clear all the details of the proposal. The activity could be approved in the next SPSC meeting. For beam time in the 2003 is better to send the proposal not later than **September 2002**.

It seems that *a-priori* there is no objection to perform such a research. If approved, the experiment will be supported, without expenses for the visiting team, by the CERN organization for what is concerning beam handling, electric power, cooling water and hut(s) for electronics, computer and data taking.

The suggested beam is the **T9** (up to 15 GeV/c, 2.5 m beam height from the floor), in the **EAST HALL**, occupied by the HARP experiment till the end of 2002, but for the moment un-booked for the 2003 (see Figure 1). For the T7 beam (up to 10 GeV/c, 1.28 m beam height from the floor), at present occupied by the LHC-B experiment, several requests are foreseen for the 2003.

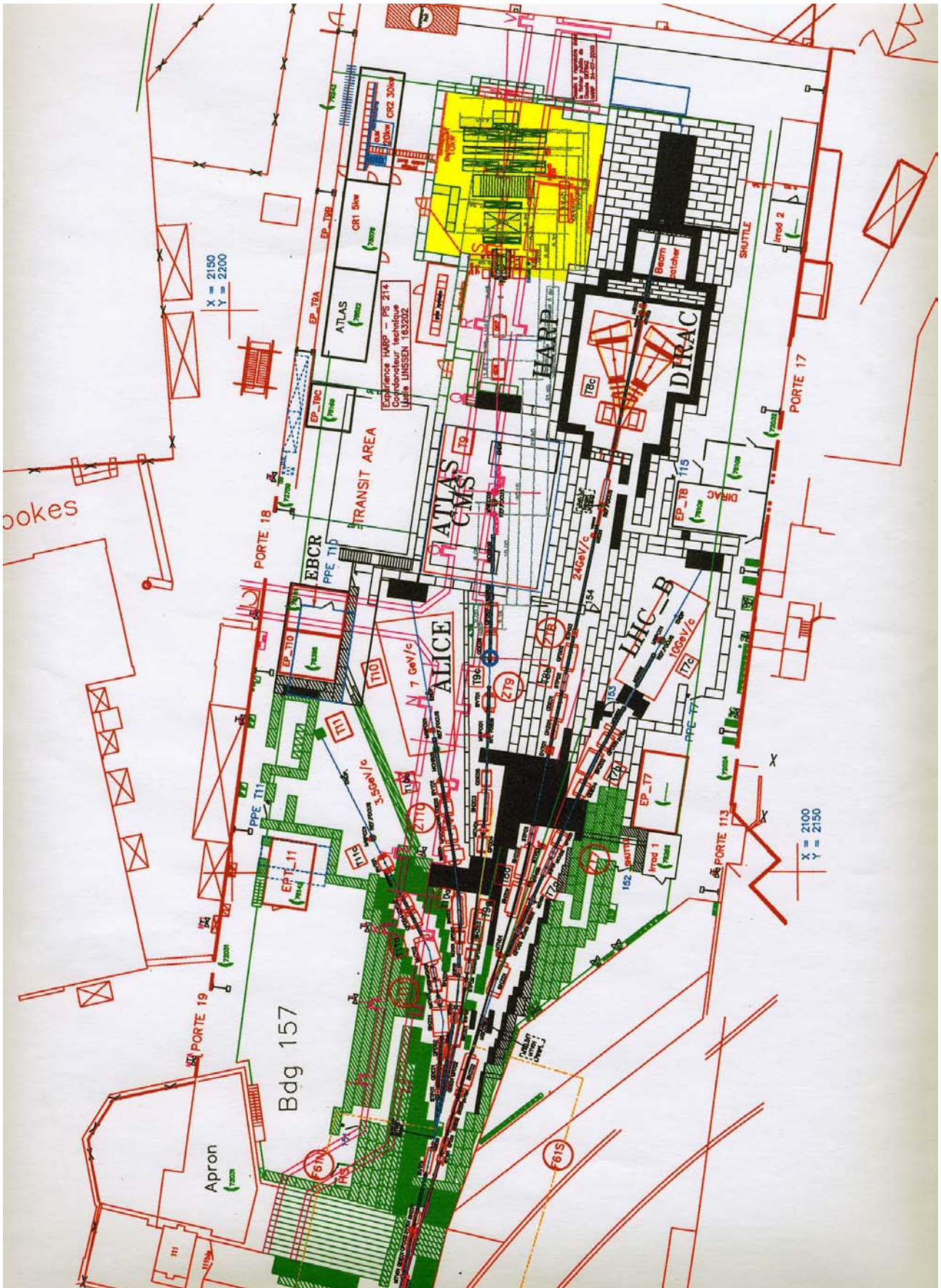


Figure 1.1 – The EAST Hall at CERN. The proposed area for μ LANNDD is marked in yellow.

Characteristics of the Beam T9

Maximum design momentum	(GeV/c)	10
Length at reference focus ¹⁾	(m)	34.5
Beam height	(m)	2.28
Production angle (mrad)	H: V: total:	--- --- 0
Angular acceptance (mrad)	α_H α_V	± 3.6 ± 5.1
Solid angle $\Omega = \pi \cdot \alpha_H \times \alpha_V$	(μ sterad)	58
Horizontal magnification at momentum slit		1.15
Dispersion at momentum slit	(mm/% $\Delta p/p$)	4.2
Theoretical momentum resolution ²⁾	(%)	± 1.1
Optical characteristics at reference focus ¹⁾		
Dispersion (mm/% $\Delta p/p$)	H: V:	--- 0.7
Magnification	H: V:	1.4 0.3
Calculated beam cross-section for full beam angular acceptance and $\Delta p/p = \pm 1\%$	(mm)	9H \times 4V

1) 2.5 m downstream of the last vertical dipole

2) For a 4 \times 4 m² apparent production target

Beam Properties

Optics

The four beams (the T7 beam was built for the experiment PS 188 - channelling) are designed in order to provide the users with momentum analysed, non-separated secondary particles (momentum resolution of the order of 1%), positive or negative polarity. They are intended to be used as test facilities for experimental apparatus.

The polarity, momentum, intensity and momentum bite may be adjusted inside a large range up to the nominal values. The experimental areas are large enough to house more than one user's apparatus at a time.

Each beam consists of two focusing stages (double monochromator):

- The first one (two quadrupoles and a bending magnet) performs the momentum analysis at a variable-aperture horizontal collimator (MCH01, "momentum slit"). A vertical collimator MCV01 may be used to adjust the beam intensity:
- The second one performs the momentum recombination (use of a "field lens") and refocuses the beam into the experimental area.

The final focus may be moved along the area by changing the currents in the last quadrupole doublet; steering dipoles are available in order to adjust the beam position (horizontal and vertical).

The beams are equipped with detectors (multiwire-proportional chambers, Cerenkov counters).

The necessary signals and equipment for beam tuning are available in EBCR (East Beam Control Room, EP 27).

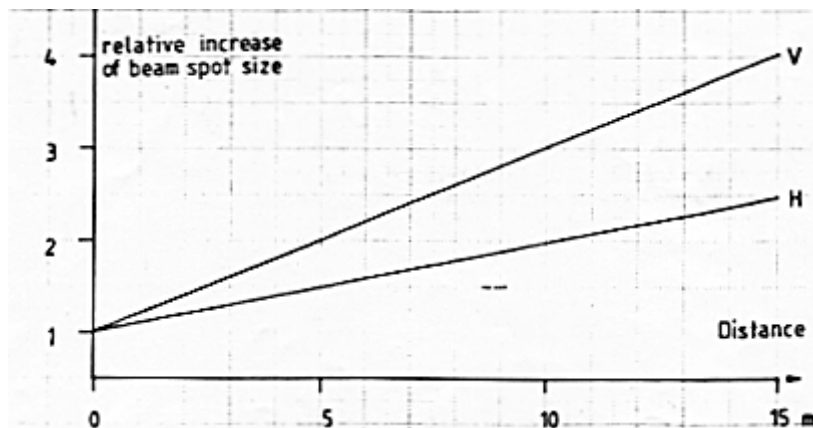


Figure 1.2 – Relative increase of beam spot size in users area (without scattering)

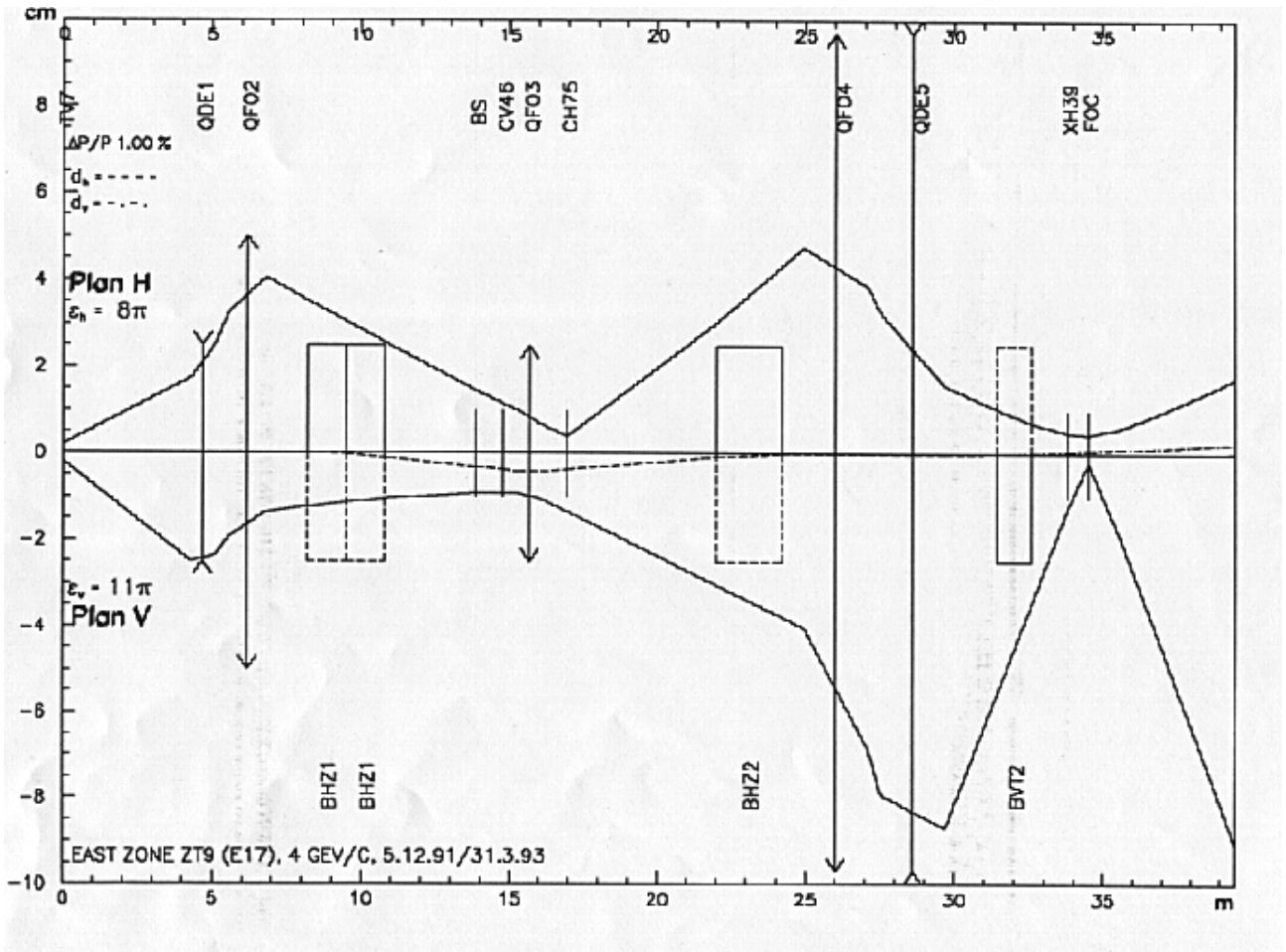


Figure 1.3 – Nominal Optics for beam T9

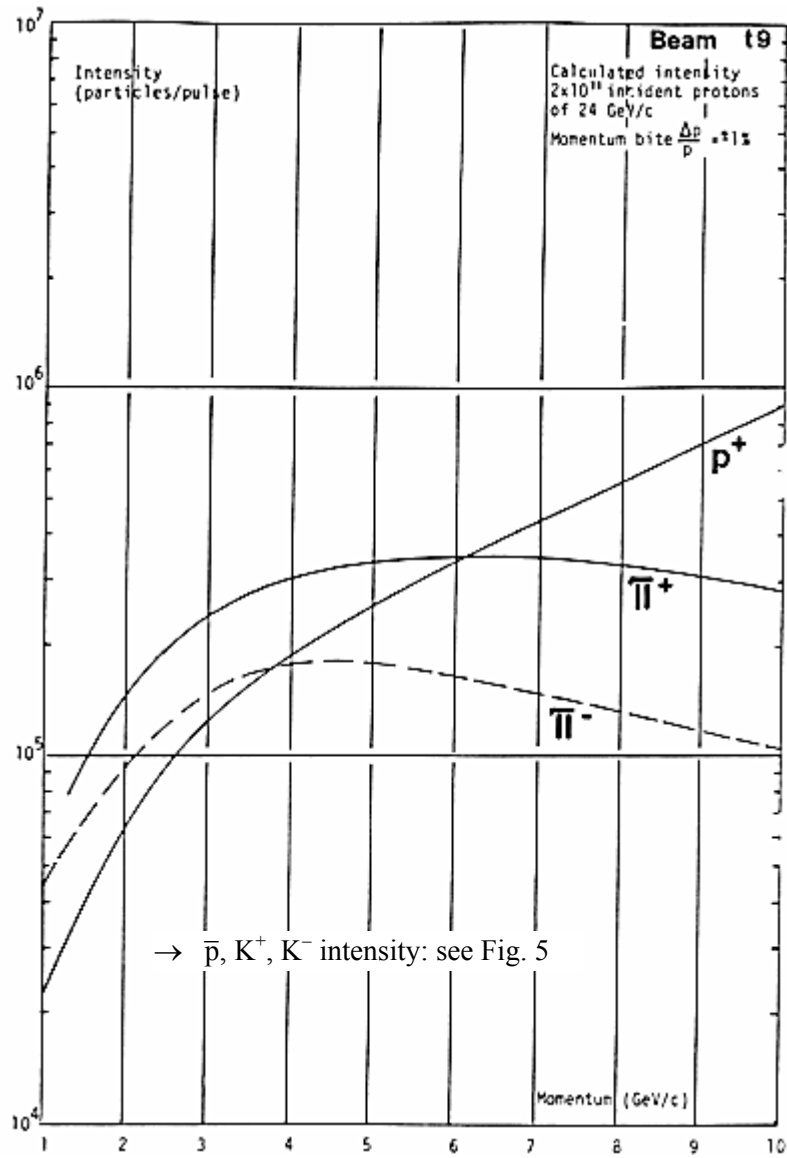


Figure 1.4 – Calculated intensity at reference focus of T9.

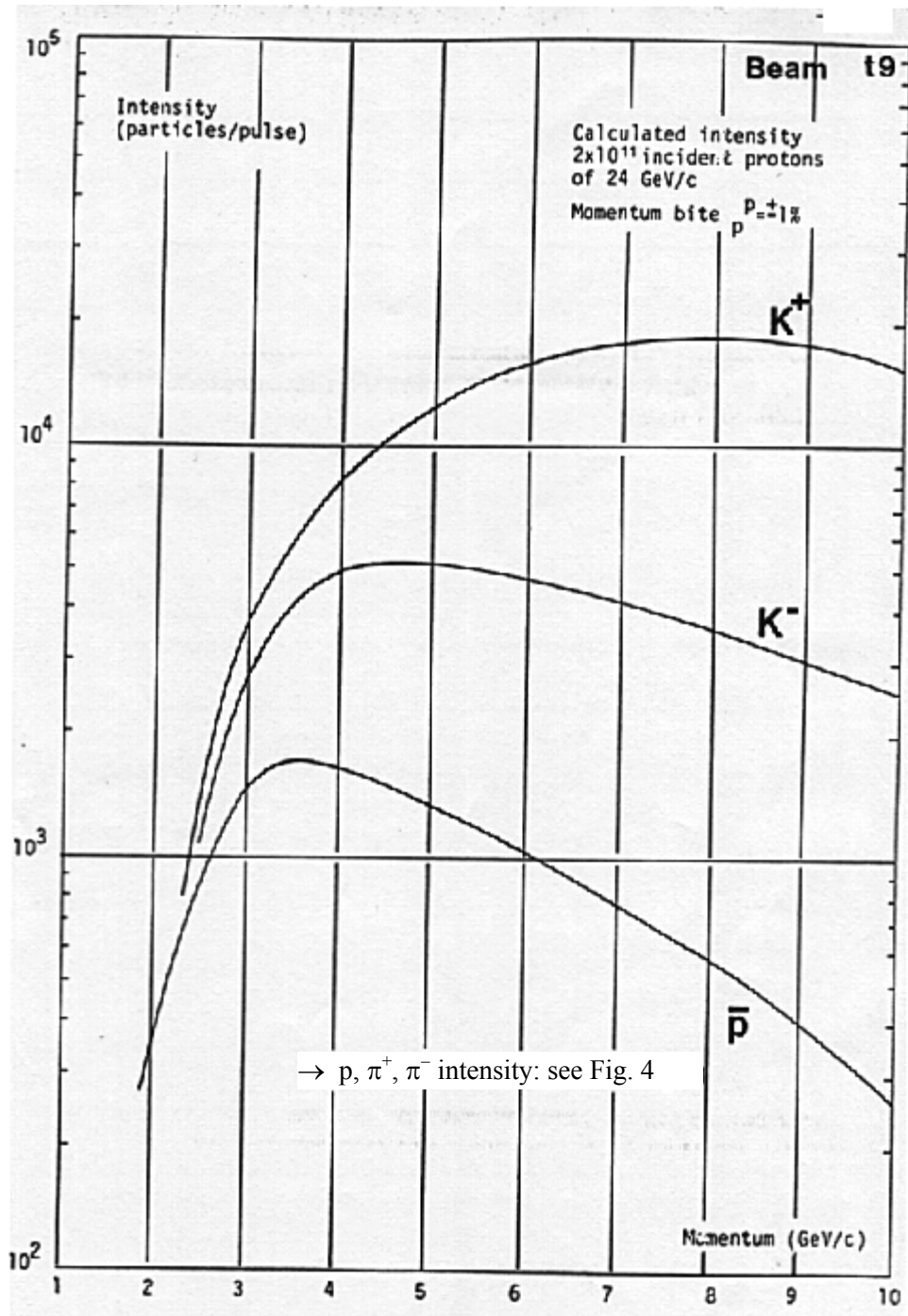


Figure 1.5 – Calculated intensity at the reference focus of T9.

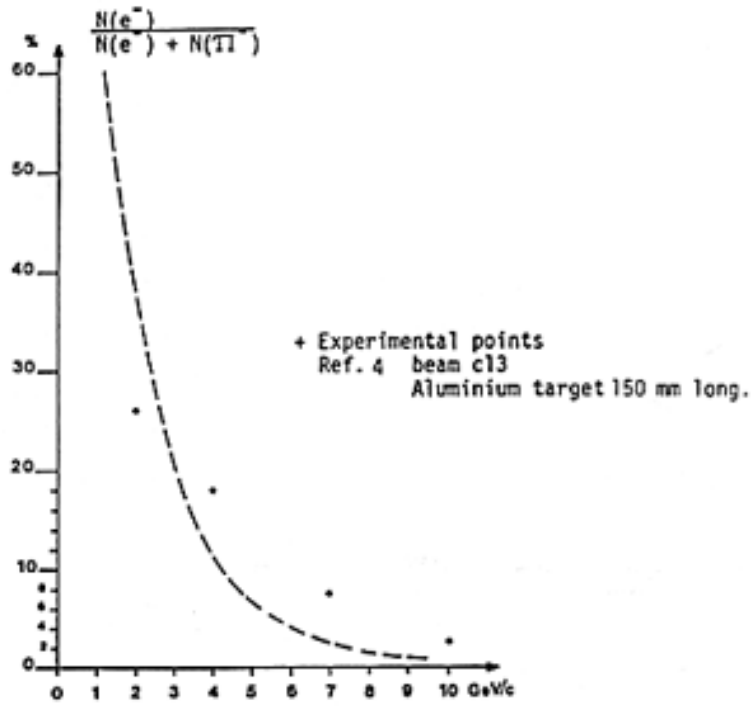


Figure 1.6 – Percentage of e^- in a negative beam (zero degree production angle)

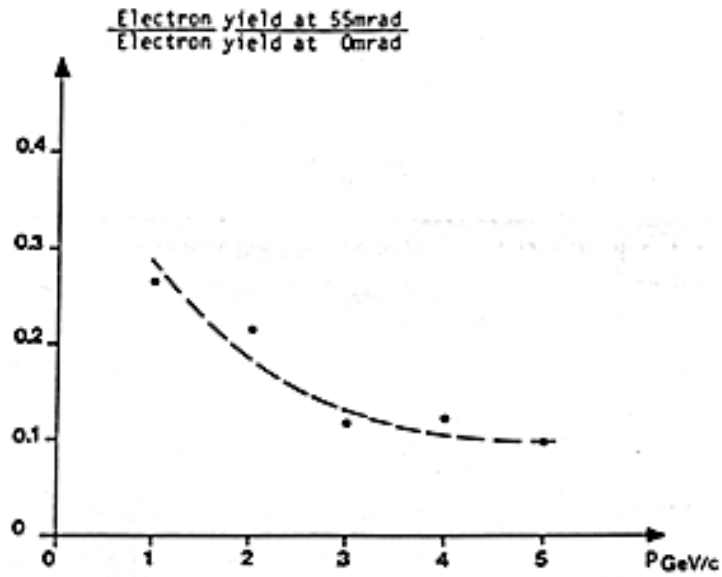


Figure 1.7 – Effect of the production angle on electron (positron) yield.

2 – Magnet

Meetings at the W. Flegel office, Bdg. 20 1-048, 11/12/01, 9:00, 14:30.

Attending:

Wilfried Flegel (EP-TA3), *Leader of the EP Division/Experimental Support/Technical Assistance 3: Engineering and Construction Group*

Claudio Cerri (INFN-Pisa)

Franco Sergiampietri (INFN-Pisa)

A list of existing magnets at CERN is produced with main parameters, status and availability.

It follows a visit to the magnet storage area (Bdg. 180).

The magnet **MNP101** (indicated also as MEP101; see experiment ISR R602; the data below refer to the combination face-to-face of MNP 101/a + MNP 101/b; the figure in the following page describes a single half) seems compatible with our requirements.

<i>Dimensions:</i>	<i>gap</i>	120	<i>cm</i>
	<i>Aperture</i>	80	<i>cm</i>
	<i>Length</i>	200	<i>cm</i>
<i>Field:</i>		1.08	<i>T</i>
<i>Power:</i>		1000	<i>A</i>
		1200	<i>kW</i>
<i>Weight:</i>		100	<i>tons</i>

Mr. Flegel informs that revision, putting in operation, test and running of CERN magnets, for an approved experiment, are on charge of his group (EP-TA3). The request of the support of EP-TA3 group should be included in the MoU.

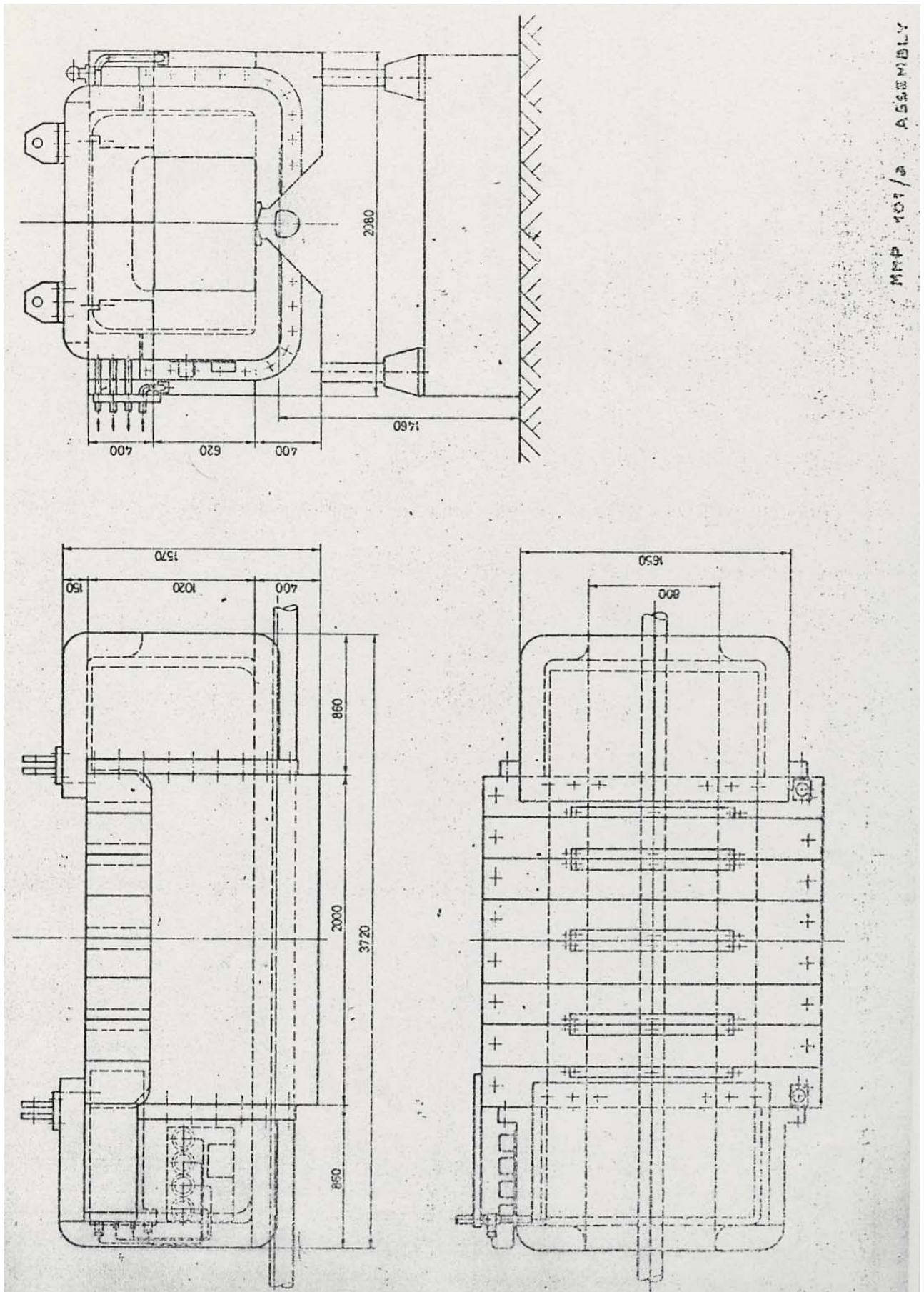


Figure 2.1 – The MNP101/a magnet (half of MNP101)

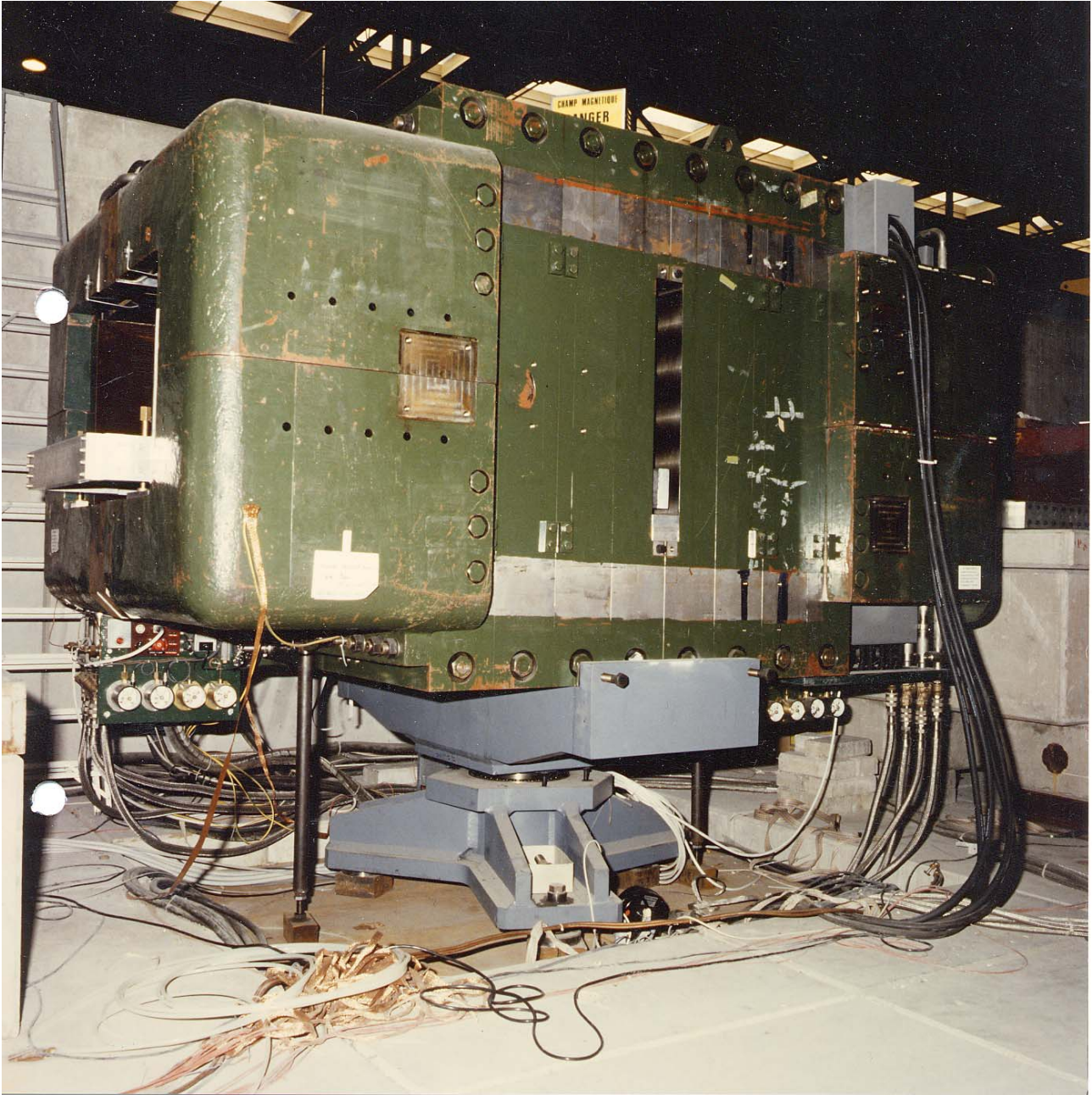


Figure 2.2 – The MNP101 magnet (two halves together)



Figure 2.3 – The MNP101 magnet dismounted.

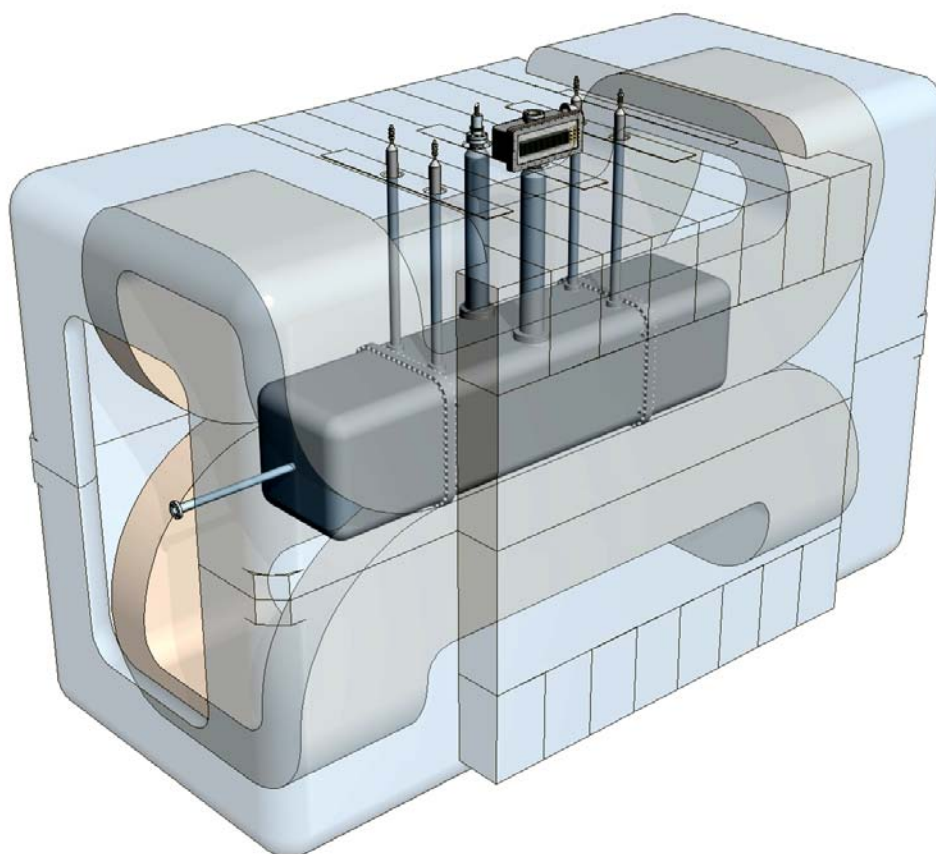


Figure 2.4 – The μ LANNDD cryostat inside the MNP101 magnet.

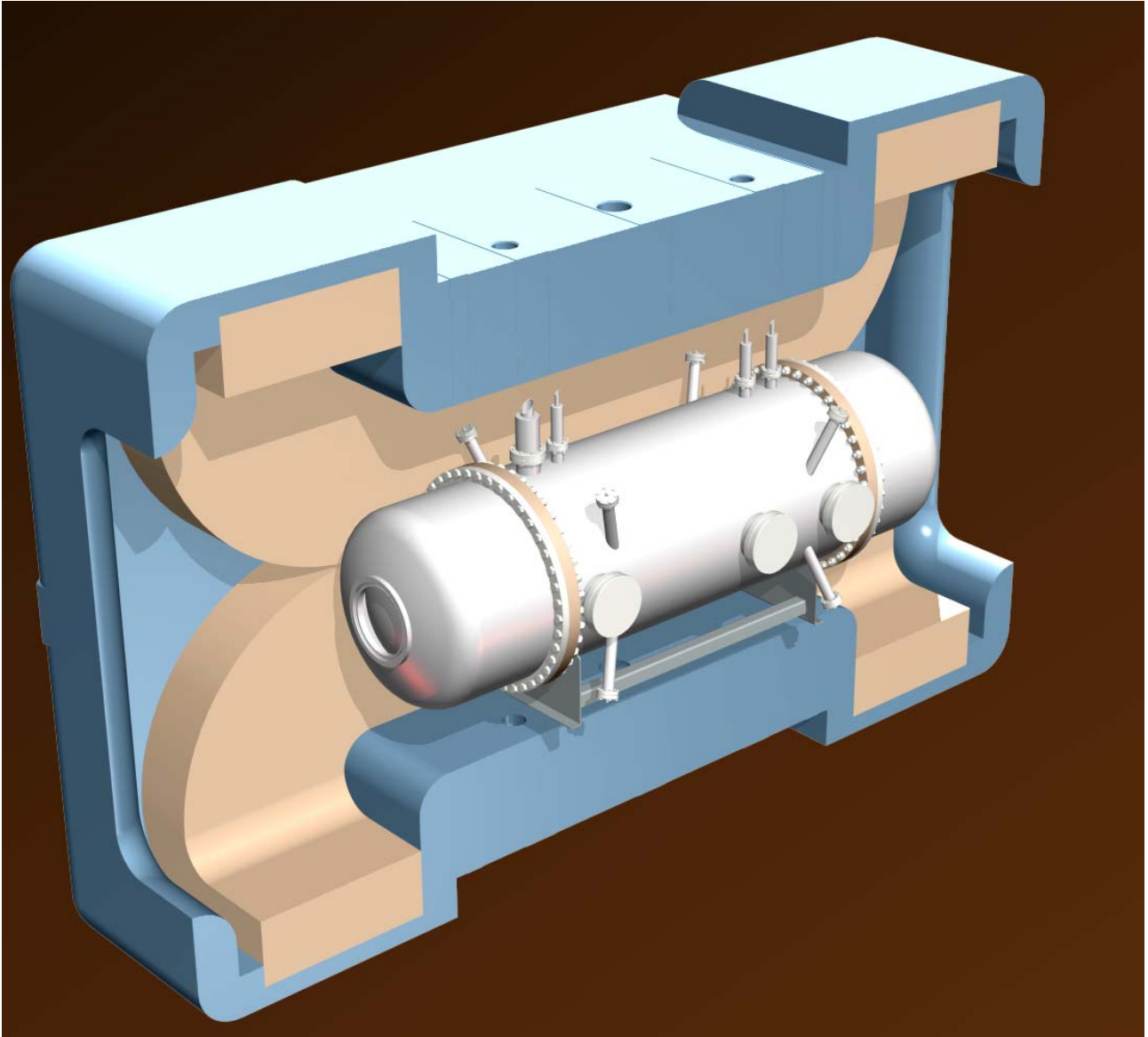


Figure 2.5 – Modified cylindrical cryostat (existing) inside the MNP101 magnet.

TENTATIVE TASK SHARING
(under construction)

- 1 – CRYOSTAT ?
- 2 – TPC, CABLING, SIGNAL/HV FEEDTHROUGHS,
DEWARS, HV POWER SUPPLIES..... PISA (?)
- 3 – ELECTRONICS, DAQ ?
- 4 – EXTERNAL CRYOGENIC EQUIPMENT (CIRCUITRY, PURIFIER, ...)..... ?
- 5 – MAGNET, TEST BEAM (EXP. AREA, BEAM CONTROL AND MONITORING)..... CERN